

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 11111-01 PCT	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/CA 01/ 00038	International filing date (day/month/year) 17/01/2001	(Earliest) Priority Date (day/month/year) 18/01/2000
Applicant NATIONAL RESEARCH COUNCIL OF CANADA		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the title,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

PARALLEL CORRELATOR ARCHITECTURE

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ None of the figures.

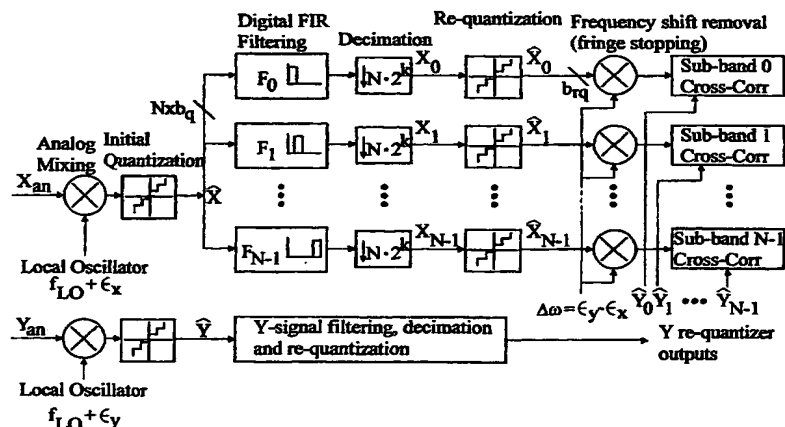
(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
26 July 2001 (26.07.2001)

PCT

(10) International Publication Number
WO 01/53982 A1

- (51) International Patent Classification⁷: **G06F 17/15** (74) Agent: **FREEDMAN, Gordon**; Freedman & Associates, 117 Centrepointe Drive, Suite 350, Nepean, Ontario K2G 5X3 (CA).
- (21) International Application Number: **PCT/CA01/00038**
- (22) International Filing Date: 17 January 2001 (17.01.2001) (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 60/176,298 18 January 2000 (18.01.2000) US (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- (71) Applicant (for all designated States except US): **NATIONAL RESEARCH COUNCIL OF CANADA** [CA/CA]; Montreal Road, Ottawa, Ontario K1A 0R6 (CA).
- (72) Inventors; and (75) Inventors/Applicants (for US only): **CARLSON, Brent, R.** [CA/CA]; S10A C8, R.R. #3, Oliver, British Columbia V0H 1T0 (CA). **DEWDNEY, Peter, E.** [CA/CA]; 109 Kendall Cres., Penticton, British Columbia V2A 2S9 (CA).
- Published:
— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

[Continued on next page]

(54) Title: **PARALLEL CORRELATOR ARCHTITTECTURE**

(57) Abstract: The present invention relates to real time spectral analysis of wide-band sampled signals, in particular to a method and system for real time digital spectral analysis of wide-band sampled signals using parallel processing techniques. The center frequency of each received wide-band signal is shifted by a small fraction ϵ of its bandwidth. After sampling and digitizing, the wide-band signals are de-multiplexed into N parallel sample streams for parallel processing. The sample streams are digitally FIR filtered and sub-band signals are determined by decimating the sample streams by a factor of $2^k N$; $k = 0, 1, \dots$, wherein only every $2^k N$ sample is retained and the others are discarded. These sub-band signals may then be processed using various methods of spectral analysis such as cross-correlation, auto-correlation or phased array applications. Any finite-length FIR filter has a finite transition band. After decimation, the transition band outside sub-band boundaries will suffer aliasing, which causes signals to falsely appear as aliased signals within the sub-band. Shifting all spectral features in the wide-band spectrum with a frequency shift ϵ prevents false correlation of the aliased signals.



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

National Application No

PCT/CA 01/00038

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F17/15

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC, PAJ, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 379 375 A (NIPPON ELECTRIC CO) 25 July 1990 (1990-07-25) abstract column 2, line 1 - line 4 column 2, line 17 - line 22 ---	1-28
A	US 5 406 586 A (WANG JIN-DER) 11 April 1995 (1995-04-11) abstract; claim 1 --- -/-	1-28



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

27 June 2001

Date of mailing of the international search report

03/07/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Pierfederici, A

INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 01/00038

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>CARLSON B R ET AL: "The S2 VLBI correlator: a correlator for space VLBI and geodetic signal processing"</p> <p>PUBLICATIONS OF THE ASTRONOMICAL SOCIETY OF THE PACIFIC, AUG. 1999, UNIVERSITY OF CHICAGO PRESS FOR ASTRON. SOC. PACIFIC, USA,</p> <p>vol. 111, no. 762, pages 1025-1047,</p> <p>XP001004502</p> <p>ISSN: 0004-6280</p> <p style="text-align: center;">-----</p>	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 01/00038

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0379375	A	25-07-1990	JP 1880360 C	21-10-1994
			JP 2190033 A	26-07-1990
			JP 6005822 B	19-01-1994
			AU 617076 B	14-11-1991
			AU 4856990 A	26-07-1990
			CA 2007922 A,C	19-07-1990
			DE 69013524 D	01-12-1994
			DE 69013524 T	08-06-1995
			US 5005185 A	02-04-1991
US 5406586	A	11-04-1995	CA 2111170 A	11-06-1995
			US 5260972 A	09-11-1993
			CA 2033931 C	27-06-1995
			DE 69022715 D	02-11-1995
			DE 69022715 T	23-05-1996
			EP 0446523 A	18-09-1991
			JP 4220892 A	11-08-1992
			KR 9408123 B	02-09-1994